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MEERSCHAUM

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BY

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MEERSCHAUM[1/]

By Alice V. Petar[2/]

INTRODUCTION

Meerschaum or sepiolite is employed principally in tobacco pipes and cigar and cigarette holders, although a few other uses of minor importance are known. The unique value of a meerschaum pipe is derived from the owner's pleasure in watching the color deepen with smoking and in having the color "set" at the desired shade. The name "meerschaum" (German for "sea foam") is applied because the material, when pure and dry, will float on water. Owing to its resemblance to the porous, bonelike structure of the cuttlefish or sepia, it is also known as sepiolite. There are a few scattered deposits of meerschaum in the United States which have yielded a small production, but the world's supply of the material is obtained principally from Asia Minor. Meerschaum deposits near Eski-Shehir, Turkey, are said to have been worked 2,000 years ago, but commercial exploitation is a development of the last hundred years.

DESCRIPTION AND PROPERTIES

Meerschaum is a hydrous magnesium silicate ($H_4Mg_2Si_3O_{10}$) having the following theoretical analysis: SiO_2, 60.8 percent; MgO, 27.1 percent; H_2O, 12.1 percent. It is a soft (H. 2 - 2.5), fine-grained, earthy, white, gray, or yellow material. It is very light weight when pure (specific gravity, 1 to 2) and is highly absorbent. Because of its porosity the proportion of water present in the mineral is affected by the humidity of the atmosphere. In a moist atmosphere the water content may be as much as 21.7 percent. When wet the material is soft and somewhat plastic. When dried again it becomes hard and tough. The toughness is especially apparent in some forms that have a fibrous or leathery texture.

1/ The Bureau of Mines will welcome reprinting of this article, provided the following footnote acknowledgment is used: "Reprinted from U. S. Bureau of Mines Information Circular 6780."

2/ Rare Metals and Nonmetals Division.

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USES

The use of meerschaum for pipe making originated more than 200 years ago (1723) in Budapest. Somewhat later, in 1767, the industry was undertaken in Ruhla in the Thüringian Forest, Germany, and subsequently the manufacture of genuine and artificial meerschaum pipe bowls and cigar holders has been centered principally in that town. The manufacture of meerschaum pipes consists in roughly cutting the irregular masses to shape, carving by hand or turning down on lathes, and smoothing with glass paper and Dutch rushes. They are then boiled in wax, stearin, or spermaceti and polished with chalk or bone ash. The color of meerschaum deepens with smoking, due to absorption of a mixture of nicotine and the finishing wax. The color continues to deepen as long as any wax remains, but when the desired color is reached it may be set by removing the remaining wax and boiling in linseed oil to fill the pores and harden the mineral. Details of the color-setting process are trade secrets. Before setting the color may be destroyed if the pipe is subjected to excessive external heat (such as washing in very hot water or drying too quickly). Artificial meerschaum pipes may be made from meerschaum chips and dust compressed into blocks. Imitation meerschaum is prepared by treating hardened plaster of paris with wax and coloring with gamboge or other pigments. Pipes made from this material are not susceptible to color change, as are the genuine meerschaum pipes.

At Vallecas, Spain, meerschaum is said to be used as a light building material, and in Turkey and Algeria it has been employed in place of soap. Meerschaum has also been used as an ingredient in porcelain.

OCCURRENCE

Meerschaum usually occurs as an alteration product of magnesite, serpentine, or possibly impure opal high in magnesium. The Turkish deposits (near Eski-Shehir) occur in a valley filled with drift material from the surrounding mountains that has been consolidated by lime. The meerschaum is scattered through the drift in nodules varying in size from that of an egg to that of a football, with fragments of magnesian and hornblende rocks.

In New Mexico meerschaum occurs in veins, lenses, seams, and balls in limestone. The mineral occurs as irregularly shaped nodules and in a somewhat massive form. The nodules range from less than an inch up several inches in diameter and are of all shapes.3/

MINING AND PREPARATION

Mining of meerschaum in Turkey is carried on in very primitive fashion, with little or no machinery. Pits are dug by pick and shovel to a depth of from 60 to 100 feet, with scaffolding to enable the workmen to descend and

3/ Sterrett, Douglas B., Meerschaum in New Mexico: U. S. Geol. Surv. Bull. 340, 1908, p. 469.

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ascend. Meerschaum nodules are removed by a system of drifts and crosscuts, and the ore is hoisted to the surface in baskets by a windlass. No timbering is employed in horizontal workings; and as virtually no pumping is done, floods and cave-ins are frequent. The crude material is sent to Eski-Shehir for preliminary treatment, consisting of removal of adhering dirt, drying, and rough polishing, before being shipped to European market centers.

At a meerschaum deposit near Sapillo Creek, N. Mex., which was mined for a few years, the contour of the country is such that it was unnecessary to sink shafts to any great depth. The main workings were in tunneling and stoping from the south side of Sapillo Mountain. At no place did the tunnel reach a distance of more than 230 feet from the surface. All mining was done by hand.

Although some of the meerschaum encountered was suitable for carving into smoking articles the bulk of the material required concentrating treatment, which Bush4/ has described as follows:

> The early equipment consisted of a coal-breaker, where the ore was supposed to have been crushed to about 2-inch cubes, after which it was spread on a large drying floor in the sun and a large percentage of the water evaporated. The mineral was then pulverized in a coffee-mill to pass a 14-mesh screen. Sizing was done in a small trommel composed of a series of 50-, 30-, 20- and 14-mesh screens. After this the sized ore was treated on what is known as the Krom concentrator, a machine that could be classified as a dry jig, the principle being air pulsation under the ore passing over screens. Due to improper sizing it was impossible to obtain a perfectly clean concentrate, and only 50 percent of the worthless material was separated from the meerschaum. This impractical and unsuccessful method of concentration was improved upon by the later management, but only in an experimental way. An automatic drier took the place of the sun-drying platform, and wet concentration was embodied in the mill, the latter being most successful and turning out an almost pure product. The most recent flow sheet of the mill was as follows: From mine to grizzlies to Samson crusher to Blake crusher; the material is then 2 inches or under; elevator to automatic drier to sizing trommel; oversize to coffee-mills, undersize to fine ore bins; part of fine ore to Krom concentrator, other as sized to Wilfley table; all tailings from Krom concentrator treated over Wilfley table with a 98 percent recovery. The meerschaum, being lighter than its gangue, reversed the process of wet concentration of copper, lead, zinc, etc. The meerschaum was washed over the table and recovered in vats at the side of the machine, while the waste material was carried to the head and discharged. The concentrate was then dried and shipped, being practically pure.

4/ Bush, Faris V., Meerschaum Deposits in New Mexico: Eng. and Min. Jour., vol. 99, May 29, 1915.

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Krom concentrators were installed at the factory and all material shipped from the mill of low percentage was reconcentrated. All meerschaum then passed through a washing machine, where foreign matter that may have collected in transit was floated off. It was next pulverized to pass 115-mesh in the ink-pulp machine. The fine product was placed in a mixing machine and thoroughly agitated, being drawn off in liquid form into molds. The drying process took from 60 to 90 days of even temperature to solidify the blocks of pure meerschaum ready for the lathes and pipe-making machinery and waxing process.

WORLD PRODUCTION

Turkey is virtually the only commercial source of meerschaum. Domestic deposits have been operated, and it is reported that 2,000,000 pounds of material containing meerschaum was shipped from a property in New Mexico, but production statistics are fragmentary. The Turkish material is packed in cases weighing 30 to 35 kilos. The following table of output of meerschaum in Turkey will serve as an index of production.

Year	Boxes	Year	Boxes
1855	3,000 1/	1926	323
1865	8,000 1/	1927	512
1869	10,500 1/	1928	41
1892	5,700 1/	1929	295
1904	3,000 1/	1930	380
1914	2,000 1/ 2/	1931	935
1924	1,779	1932	107

1/ Exports. 2/ Estimated.

DOMESTIC PRODUCTION AND DEPOSITS

In the United States virtually the only meerschaum deposits of potential importance are in New Mexico. Two deposits in Grant County have been described by Sterrett.[5] One is in the Alunogen mining district, on the headwaters of Sapillo Creek, about 23 miles by air line north of Silver City, and the other, the Dorsey mine, is in the Juniper mining district in Bear Creek Canyon about 12 miles northwest of Silver City. The former deposit, which is also described by Bush[6], was discovered early in 1875 by prospectors en route to the Upper Gila country, and shortly after, several claims were located on the main vein. However, lack of transportation facilities prevented development. After being purchased in 1901 by a group of men from Silver City the claims changed hands several times. In 1905, the Meerschaum Co. of America was organized and began operations in a small way, with a

5/ Sterrett, Douglas B., Meerschaum in New Mexico: U. S. Geol. Surv. Bull. 340, 1907, pp. 466-473.

6/ Bush, Faris V., Meerschaum Deposits of New Mexico: Eng. and Min. Jour., vol. 99, May 29, 1915, pp. 941-943.

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factory in New York. Although the finished product is said to have been of good grade the company was forced into the hands of a receiver. In 1912 operations were resumed by the newly organized American Meerschaum & Pipe Corporation, and a factory was established at Ogdensburg, N. Y. A relatively large tonnage (quantity not stated) was extracted, but early in 1914 this company also went into the hands of a receiver. Failure to operate profitably is ascribed to inefficient mining and milling methods.

In Utah, beds of meerschaum in the Green River formation, in sec. 11 (?), T. 10 S., R. 7 W., Duchesne County, have been described by Bradley7/, who compares the material to deposits at Vallecas about 5 miles south of Madrid, Spain.

Other occurrences of meerschaum in the United States have been noted in Arroyo de San Jose de Gracia, Santa Clara County, Calif.; near Concord and Middletown, Delaware County, and near West Nottingham, Chester County, Pa.; at the Cheever iron mine, Richmond, Mass.; at New Rochelle, Westchester County, N. Y.; and at Webster, Jackson County, N. C.

IMPORTS

Imports of meerschaum into the United States since 1922 have been as follows:

Year	Pounds	Value
1922	4,297	$15,506
1923	10,638	19,279
1924	16,646	22,649
1925	7,891	19,981
1926	7,486	19,445
1927	5,283	11,048
1928	4,871	7,837
1929	3,348	8,326
1930	1,894	4,395
1931	2,355	5,966
1932	1,077	2,888
1933	788	2,536

TARIFF

Under the Tariff Act of 1930 (par. 1552) a duty of 20 per centum ad valorem is imposed on meerschaum, crude or unmanufactured.

7/ Bradley, W. H., The Occurrence and Origin of Analcite and Meerschaum Beds in the Green River Formation of Utah, Colorado, and Wyoming: U. S. Geol. Surv. Prof. Paper 158a, 1930, pp. 1-7.

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PRICES

Market quotations for meerschaum are not available, but import values since 1922 indicate average foreign market prices per pound, as follows:

1922	$3.61	1928	$1.60
1923	1.81	1929	2.48
1924	1.36	1930	2.32
1925	2.53	1931	2.53
1926	2.60	1932	2.68
1927	2.09	1933	3.22

THE INDUSTRY IN FOREIGN COUNTRIES

As previously stated, the most important sources of meerschaum are deposits in Turkey near Eski-Shehir (about midway between Istanbul (Constantinople) and the capital city, Ankara (Angora). These deposits lie in a small area in the valley of the Pursak River. Meerschaum mining in this region was undertaken more than 2,000 years ago, but the deposits have been exploited actively only since the middle of the nineteenth century. Formerly permits to mine were given freely to the local inhabitants, and several thousand persons were engaged in mining and treating meerschaum. In recent years, however, the Turkish Government (which owns the deposits) has attempted to restrict mining and to place the industry on a firmer basis. The five main quarries mined cover an area of 100 square kilometers and are known as: (1) Kemikli (14 pits, of which 4 are now worked); (2) Sepetji (14 pits worked); (3) Sari-Siva, near the village of Kratich (10 pits worked); (4) Kara Heivek (11 pits worked); (5) Harmanlar, or Houli, near the village of Narghi (4 pits worked). The total number of pits sunk in the whole area exceeds 2,000[8/].

Other deposits of meerschaum are on the islands of Euboea and Samos, Greece; near Hrubschitz, Moravia, Czechoslovakia; in Bosnia; in Morocco; and near Vallecas, Madrid, and Toledo, Spain. A related mineral, aphrodite, is found near Langbanshyttan in Vermland, Sweden.

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8/ Bell, H. T. Montague, The Near East Yearbook, 1931-32. P. 751.

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